



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/039,275	01/04/2002	Joseph Yahalom	005931 CPI/COPPER	8306
32588	7590	04/02/2004	EXAMINER	
APPLIED MATERIALS, INC. 2881 SCOTT BLVD. M/S 2061 SANTA CLARA, CA 95050			KOEHLER, ROBERT R	
			ART UNIT	PAPER NUMBER

1775

DATE MAILED: 04/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/039,275

Applicant(s)

YAHALOM ET AL.

Examiner

Robert R. Koehler

Art Unit

1775

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-85 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-32, 39-77 and 81-85 is/are allowed.
- 6) ☒ Claim(s) 33-35 and 78-80 is/are rejected.
- 7) ☒ Claim(s) 36-38 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

*RRK*

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 04152002.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

Art Unit: 1775

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 33 and 80 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S.

Patent No. 2,689,216 (Nevers, et al.).

Nevers, et al. discloses a consumable (soluble) copper anode containing phosphorus and small amounts of tellurium. Also, Nevers, et al. discloses a method of reducing sludge formation during electroplating of copper over a substrate by operating an electroplating cell at an average current density of about 25 amperes per square foot wherein the electroplating cell contains a soluble copper anode having small amounts of tellurium. According to Nevers, et al., the presence of phosphorus and tellurium in the soluble copper anode causes the development of a tenacious and dense black film over the copper anode during the electrolytic operation. The presence of an adherent dense black film on the copper anode minimizes sludge formation during the electrolysis operation. See lines 15 to 33 in column 2 and lines 26 to 57 in column 5.

2. Claims 34, 35, 78, and 79 are rejected under 35 U.S.C. 102(a) as being anticipated by U.S. Patent No. 6,261,433 (Landau).

Art Unit: 1775

Landau discloses a method and an apparatus directed to the electrodeposition of copper onto a substrate by utilizing a consumable copper anode, applying a current to the consumable anode, and providing a suitable reference electrode in order to measure the applied potential of the copper anode. In the section entitled "Electrochemical Cell Hardware," see line 34 in column 12 to line 13 in column 13 and lines 7 to 9 in column 14.

**3.** Claim 80 is rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Application Publication No. 2003/0000604 (Bishop, et al.); Filing Date of Jul. 2, 2001.

Bishop, et al. discloses a cast, fine-grained consumable copper anode comprising phosphorus and tellurium. See paragraph [0014] (page 1) to paragraph [0017] (page 2).

***Allowable Subject Matter***

Claims 1 to 32, 39 to 77, and 81 to 85 are allowed.

Claims 36 to 38 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art does not teach, suggest, or disclose applicants' claimed *method* and *apparatus* directed to the electrodeposition of copper onto a substrate by utilizing a consumable copper anode whereby reduced sludge formation during the copper electrodeposition operation is achieved by maintaining the electrode potential of the consumable anode at a value greater than or equal to 0.9 V (vs. normal hydrogen scale) *and/or* providing a consumable anode having a particular exposed surface area to the electrolyte solution that is less than or equal to one-half of an exposed surface area of the substrate to the electrolyte solution. Furthermore, applicants' specification at paragraph [0052] (pages 15 and 16) states that a copper anode at an applied potential of about 2.0 V (vs. SCE) and at about 3.5 V (vs. SCE) was less likely to have particles fall off producing sludge. Applicants' experimental data in Table 3 and Table 4 on pages 17 and

Art Unit: 1775

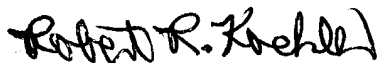
18 of the specification show the reduced amounts of sludge for a copper anode operated at an applied potential greater than or equal to about 2.0 V (vs. SCE), and this electrochemical behavior of a consumable copper anode is not taught or reasonably suggested by the prior art.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Robert Koehler whose telephone number is **(571) 272-1536**. The Examiner can normally be reached on Tuesday to Friday from 9:30 AM to 7:00 PM. The Examiner can also be reached on alternate Mondays.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Deborah Jones, can be reached on **(571) 272-1535**. The fax phone number for the organization where this application or proceeding is assigned is **703-872-9306**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at **866-217-9197** (toll-free).



**ROBERT R. KOEHLER  
PRIMARY EXAMINER**

**Art Unit 1775  
March 25, 2004**